Trans-axillary Robotic Thyroidectomy: Avoiding the Chest Port

Meghan N. Wilson, MD; Daniel B. Noel, BS;
Michael DiLeo, MD; Rohan R. Walvekar, MD

Department of Otolaryngology and Head & Neck Surgery, Louisiana State University Health Sciences Center, New Orleans, LA

Abstract

Objective:
Describe modification of port placement for the four-arm technique of robotic thyroidectomy to avoid a chest incision and eliminate crowding of the working space provided by the trans-axillary incision.

Methods:
Description of port placement modification to avoid chest incision and report of two cases with appropriate literature review is presented.

Results:
Trans-axillary robotic hemithyroidectomy (TART) is often performed with a second chest incision, but the move toward single incision operation and placement of four arms via a single incision requires expertise. We describe two patients who underwent TART using a trans-axillary incision and a separate 1 cm incision in the anterior axilla 2.5 centimeters below the trans-axillary incision for placement of the fourth arm. This design allowed for a more ergonomic placement of the forth arm while not compromising the working space provided by the trans-axillary incision. Additionally this port was used for surgical drain placement.

Conclusions:
Robot-assisted trans-axillary thyroidectomy poses several challenges in the early surgical learning curve. One roadblock to exposure and efficiency is appropriate port and arm placement. Our modification offers an alternative where a four-arm technique is made possible without a chest port and not occupying the working space provided by the trans-axillary incision. Use of this inferior axillary port is cosmetically acceptable, surgically efficient, and allows avoidance of a visible chest incision for placement of the fourth arm.

Introduction

Trans-axillary Robotic Thyroidectomy (TART) is becoming increasing popular in the United States. TART was developed as patients increasingly desired to avoid visible scaring. TART allows avoidance of a neck incision and moves the incision to the less visible axilla.

When originally described by the South Korean group[1], TART was performed using an axillary incision as well as a smaller anterior chest wall incision.[1,2] This second incision was used for the placement of a fourth surgical instrument. This technique, however, still left a visible scar on the chest, and thus modifications have been developed using a single incision in the axilla. While some american surgeons have also published reports using this technique, others have noted difficulties adapting this technique in the United States, where the average body mass index (BMI) is higher.[3-5] In some cases, it is not possible to use all 4 robotic arms through a single axillary incision.

This poster describes our modification of using a second axillary incision, allowing the four-arm technique for robotic thyroidectomy yet avoiding a chest incision and eliminating crowding of the working space provided by the trans-axillary incision.

Surgical Technique

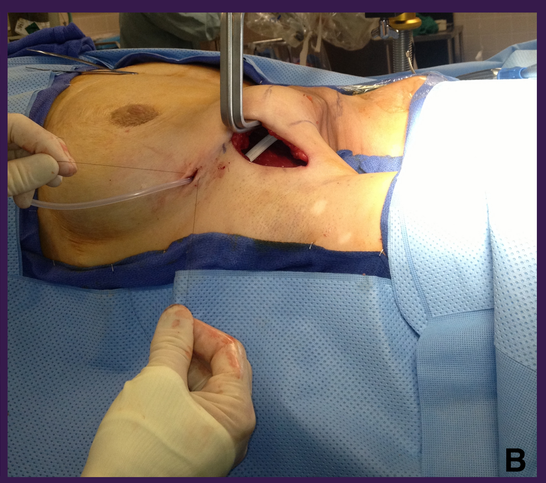
Prior to induction of anesthesia, the patient's arm is extended overhead and positioned. This allows the patient to confirm comfortable positioning. A Nerve Integrity Monitor (NIM) endotracheal tube (Medtronic, Minneapolis, MN) was used for all cases.

A 6 cm incision is made in the anterior axilla and tissue is dissected down to the pectoralis major muscle fascia. Dissection is then carried anteriorly over the clavicle to the sternocleidomastoid muscle followed by identification of the strap muscles. A second 1 cm incision is made in the axilla approximately 4 to 5 cm inferior to the first incision.

The da Vinci robot (Intuitive Surgical, Inc., Sunnyvale, CA) is then brought in and docked. Three arms (telescope, maryland retractor and harmonic focus (Intuitive Surgical, Inc., Sunnyvale, CA)) can be introduced through the 6 cm incision. A fourth arm, containing the Prograsp instrument (Intuitive Surgical, Inc., Sunnyvale, CA) is inserted through the second incision (Figure A).

After thyroidectomy is completed, the suction drain is placed through the 1cm, inferior axillary incision (Figure B).


A


B

Results

Two patients have undergone TART using a 6 centimeter trans-axillary incision and a separate 1 cm incision in the anterior axilla 2.5 centimeters below the primary trans-axillary incision. Three robotic arms are inserted through the primary incision and the fourth arm is inserted through the second, smaller incision. This design allows for a more ergonomic placement of the forth arm while not compromising the working space provided by the trans-axillary incision. Additionally this port is used for surgical drain placement.

Both patients were female, The first patient was 54 years old with a BMI of 30.8. She underwent thyroid lobectomy. The lobe was 4.4x2.2x1.9 cm and pathology was benign. Surgery was completed without complications. The second patient was 35 years old and had a BMI of 31.8. This patient also underwent thyroid lobectomy, having a 5.7x3.5x2.2cm lobe and benign pathology. She had temporary ipsilateral vocal cord paresis noted in the recovery room that resolved by the first postoperative visit.

Discussion

In a surgical technique designed to minimize scarring, it is undesirable to use a chest incision as an additional port if this can be avoided. The modification presented here provides an additional port but in a location able to hide scaring.

Several studies with large patient numbers have described the ability to perform trans-axillary thyroidectomy safely through a single, axillary incision. The initial studies and the largest series have been performed in South Korea.[1,2] North American groups have also reported on the feasibility of a single-incision approach.[3-5] Kuppersmith et al[3] safely performed single-incision trans-axillary robotic thyroidectomy in 16 cases and Landry et al published a series of 12 cases utilizing a single axillary incision.

On the other hand, some authors have described difficulties with this technique in patients with a larger body habitus. Lin et al[4] reviewed 18 thyroid lobectomies in 16 patients and encountered difficulty in inserting all instruments through the single incision in 5 cases. A chest incision had to be added in one case and in the other four cases, fewer robotic arms were able to used, limiting the number of surgical instruments in the field. He noted that the mean BMI of patients in his study (28.7) was higher than those of Kuppersmith[3](24.7) and Landry et al[5] (25.2).

When looking at any new technique, safety is the first priority. The South Korean group has found no difference or lower complication rates in their single incision cohort compared to the two incision cohort. This, however, reflects the results of highly experienced surgeons who were proficient in the two incision technique prior to moving toward single incision surgery. There is a learning curve to trans-axillary robotic thyroidectomy. We suggest that in a surgeon's early experience, it is helpful to have a second incision and recommend placement of that incision in the axilla as described here.

Conclusions

TART can be done through a single axillary incision in many patients. However, in large body habitus patients and surgeons early in their robotic experience, a second incision is helpful for placement of the fourth robotic arm. This second incision can be placed in the axilla and subsequently used as the exit point for a drainage tube.

References

1. Kang SW, Jeong JJ, Yun JS, et al. Robot-assisted endoscopic surgery for thyroid cancer: experience with the first 100 patients. Surg Endosc 2009;23:2399–2406
2. Kang SW, Lee SC, Lee SH, et al. Robotic thyroid surgery using a gasless, transaxillary approach and the da Vinci S system: the operative outcomes of 338 consecutive patients. Surgery 2009;146: 1048–1055
3. Kuppersmith RB, Holsinger FC. Robotic thyroid surgery: an initial experience with North American patients. Laryngoscope 2011;121:521–526.
4. Lin HS, Folbe AJ, Carron MA, et al. Single-incision transaxillary robotic thyroidectomy: challenges and limitations in a North American population. *Otolaryngol Head Neck Surg.* 2012 Dec; 147(6): 1041-6.
5. Landry CS, Grubbs EG, Morris GS, et al. Robot assisted transaxillary surgery (RATS) for the removal of thyroid and parathyroid glands. Surgery 2011;149:549-555.